Value Added and Equity in the Smallholder-produced Teak (*Tectona grandis* L.f.) Poles Value Chain in Southern Benin

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Summary

This article assesses the value added created, and equity in the smallholder-produced teak poles value chain in Southern Benin. The questions intended to be addressed were as follows: how well does the value chain contribute to create wealth? How fairly is the value added shared among chain participants? What are the opportunities for smallholder farmers to capture a wider share of the value added? The study was based on data from 103 teak planters surveyed in the Atlantic Department, and 89 teak poles traders operating in five major cities. The consolidated production-trading account of the value chain was elaborated. The level of equity in the value chain was analysed based on the costs borne, the contribution to the value added, and the share of value added received by each stakeholder. The value chain generated a positive value added. Traders were the main contributors, and the first beneficiaries of the value added. However, there was no sufficient evidence of inequity to the disadvantage of farmers. There is avenue for farmers to upgrade in the value chain by acquiring new functions, to increase the farm gate value of timber. The related policy implications were discussed.

Résumé

Valeur ajoutée et équité dans la chaîne de valeur des perches de teck (*Tectona grandis* L.f.) au Sud-Bénin

Nous avons évalué la valeur ajoutée créée, et l'équité dans sa répartition entre les agents de la chaîne de valeur des perches de teck au Sud-Bénin. Les questions abordées sont : la chaîne de valeur créée-t-elle la richesse ? Y a-t-il équité dans la répartition de la valeur ajoutée entre les agents de la chaîne ? Quelles sont les opportunités pour les petits exploitants d'obtenir une plus grande part de la valeur ajoutée ? L'étude est basée sur des données de 103 planteurs de teck enquêtés dans le département de l'Atlantique, et 89 commerçants de perches de teck opérant dans cinq grandes villes. Après l'élaboration du compte consolidé de la chaîne de valeur, le niveau d'équité a été analysé en considérant les coûts supportés, la contribution à la valeur ajoutée, et la part de valeur ajoutée reçue par chaque acteur. La chaîne de valeur génère une valeur ajoutée positive. Les commerçants sont les premiers contributeurs, et aussi les premiers bénéficiaires de la valeur ajoutée. Les résultats ne traduisent pas d'iniquité en défaveur des paysans. Ces derniers peuvent améliorer leur part de valeur ajoutée, en s'appropriant de nouvelles fonctions permettant d'accroître la valeur bord champ du bois. Les implications de politique ont été discutées.

Introduction

Economic activities are targeted to create wealth, an indicator of which is the value added (18, 21). Therefore, the potential of an industry to generate value added is a performance indicator (12, 14). The value added is shared among various beneficiaries involved in the chain. The ability of smallholder farmers in developing countries to capture a significant share of that value added is a critical policy matter (1). The rationale is that poverty alleviation, especially in rural areas remains a critical issue in those countries.

One controversial debate about farm products value chains in developing countries is related to the distribution of benefits among stakeholders. As highlighted by Fafchamps and Gabre-Madhin (6), traders are often viewed as making excessive profits, to the detriment of farmers. Regarding timber value chains, it is often reported that smallholder farmers receive a small share of the benefits (17). Therefore, the following questions are of interest to enlighten policy makers on relevant options to support smallholder-produced timber value chains: (i) how well do farm-grown timber value chains contribute to create wealth? (ii) How fairly is the value added shared among value chain participants? (iii) What are the opportunities for smallholder farmers to capture a wider share of the value added? Those are important questions because the view that agricultural products traders were getting excessive profits had provided rationale for attempts to eliminate them, through the setting-up of government-led marketing boards

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and arbitrary pricing; but those policies were clearly unsuccessful (10). The objective of this article was to assess the potential of the smallholder-produced teak poles value chain in Southern Benin to create wealth, as well as equity in benefits sharing.

Teak planting by smallholder farmers in Southern Benin has developed from the 1970s. Pole - i.e., timber with diameter ranging from 5 to 15 cm - is the main category of timber produced by farmers. This is done through coppicing, with rotations of 3 to 5 years on average. Two main stakeholders were involved in the value chain: teak planters and timber traders. Farmers sell stumpage timber to traders who in turn make the product available to urban consumers in retail outlets, after logging, loading, transportation, off-loading, and sorting. It was hypothesised that the smallholder-produced teak poles value chain contributes to create wealth. It was also asserted that the value added is unfairly distributed to the detriment of farmers.

Studies concluding on the exploitive nature of trade often build only on benefits sharing in value chains (15, 22). The limitation of this approach stems from the ignorance of the costs borne by traders to perform marketing functions to the benefit of farmers and consumers. Equity, as a performance indicator, is related to how fairly benefits and costs are shared among chain participants (5, 7). Since participants in a given channel perform various functions to move on the product from production to consumption, they bear various levels of costs that should be taken into account while discussing about equity in the value chain. In this study, we consider both the gross profit and the costs to assess equity in the chain.

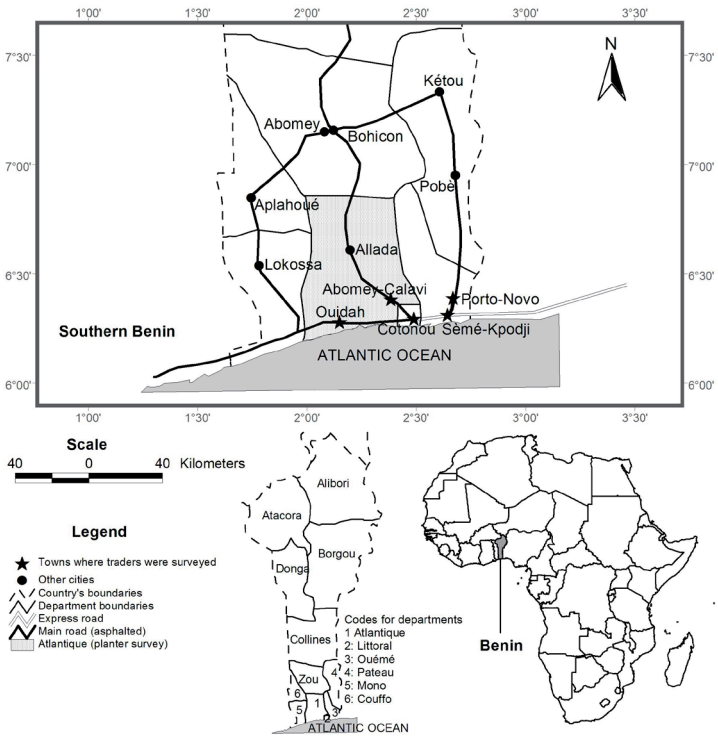

Figure 1: Map of Southern Benin.

Figure 2: A lorry being loaded plantation gate.

Methods

Sampling and data collection

Data were collected between March and September 2010. Teak planters were surveyed in the Atlantique department (Figure 1), across five communes representative of the agro-ecological conditions under which teak has been planted in the region. Traders were surveyed in five cities where they operate (Figure 1).

Since no database of value chain agents was available, respondents were selected based on cluster sampling at the lowest administrative level (village for teak planters and city quarters for traders). The survey randomly covered about 15% of villages in the selected communes, for planters, and 15% of urban quarters in each town, for traders (2). Among other, detailed data were collected on the costs and revenue related to timber production (from planters), and marketing (from traders). At planters' level, costs and revenue data were related to the last production cycle completed. From the side of traders, economic data were collected about the last consignment of teak poles purchased and sold.

Traders often purchase timber based on a unit consisting in the loading of one lorry, containing on average 600 poles (Figure 2). In the planters' survey, the acreage of plantation was recorded, and the number of loadings of 600 poles harvested as well. That way, it was possible to make all economic calculations per loading of 600 poles[1].

Data handling

Data processing methods were built on guidelines for value chain analysis (e.g., 14, 21). Since the final target of the study was to elaborate a single production-trading account for the whole value chain, it was critical to ensure the reference period of economic data be identical for planters and traders. The planter survey covered a total of 254 farmers, 103 of whom sold

[1]As indicative figure, one hectare of teak poles yields on average 2.5-3.5 lorry loadings.

their plantation in the period where traders purchased their last consignment (between November 2009 and April 2010). From the side of traders, 107 respondents were surveyed, 18 of whom were excluded from the analyses. These were traders who did not purchase timber from planters, but from other traders performing wholesale function on occasional basis. The rationale for excluding those respondents was to concentrate on the dominant trade behaviour in the value chain.

Production-trading account per stakeholder

At this stage, the value added was calculated separately for planters and traders: $VA=SR-II$ (1); where *VA* is the value added, *SR* is the total sales revenue, and *II* is the value of intermediate inputs involved in the activity.

The calculation was simple for traders, but costs accounting was used to charge fixed costs per consignment of 600 poles (licence costs, financial costs, taxes, and personnel remuneration). From the side of teak planters, the temporal value of money was integrated in the calculations, because the production cycle lasts several years (3-5 years). This was addressed by capitalising costs and revenues during the rotation. A 3% annual interest rate - savings remuneration rate during the study period - was used.

The value added usually encompasses the agent's return (gross profit), personnel remuneration, taxes, and financial costs (14, 21). The gross profit was calculated as: $GP= VA-(PR+T+FC)$ (2); where *GP* is the gross profit, *VA* is the value added, *PR* is personnel remuneration, *T* is taxes, and *FC* is financial costs.

Accounts consolidation and analysis of equity in the value chain

The consolidation of value chain accounts consists in elaborating a single production-trading account for the whole value chain. Internal flows of teak poles between farmers and traders are ignored (cf. 14, 21 for details).

We compared planters and traders based on their costs, the value added created, and their gross profit. This was done by performing Student's *t* test for means comparisons.

Results

Value added in the value chain

Table 1 shows the consolidated production-trading account of the value chain; and table 2 is useful to understand inputs consumption and value added creation along the chain. Teak pole was the main revenue source in the value chain and represented 97% of the turnover. Besides this main product, additional income was obtained at planters' level from by-products, including firewood and maize intercrop which is grown during the first year of the establishment of the plantation (Table 1).

The value added generated by the value chain was positive and represented 76% of the turnover (Table 1). The ratio 'value added/intermediate inputs' amounted 3.2 (Table 1). Intermediate inputs encompassed teak planting material (seed, seedlings) and its transportation to the field, teak poles transportation, trader's travel costs, communication, renting of the retail outlet, licence costs, and broker commission. The vast majority of those inputs were related to marketing stage; inputs at production level were limited to the planting material and its transportation to the field, and 31% of the broker commission (Table 2). Teak poles transportation from plantation gate to the retail outlet in metropolitan centres was the major component (three quarters) of intermediate inputs in the value chain (Table 1).

Table 1
Consolidated production-trading account for a loading of 600 teak poles

Item		Amount (XOF[a])
	Planting material	2686
	Transport of seedlings	46
	Transportation of teak pole	72789
	Trader's travel	1226
	Communication	412
	Renting of the retail outlet	7471
	Licence costs	5227
	Broker commission	5430
Intermediate inputs		95287
	Remuneration of rural workers	42862
	Remuneration of urban workers	25229
	Bribe	24629
	Financial costs	571
	Local tax	2372
	National tax	4523
	Planters' gross profit	60022
	Traders' gross profit	140797
Value added		301005
	Pole revenue	384258
	Firewood revenue	4376
	Maize revenue	7658
Turnover		396293

Note: 'Intermediate inputs' is the sum of teak planting material and its transportation to the field, transportation of teak pole, trader's travel, communication, renting of the retail outlet, licence costs, and broker commission. The value added is obtained by subtracting intermediate inputs from the turnover. The turnover is the sum of teak poles revenue, firewood revenue, and maize revenue.

[a] XOF: Local currency; the exchange rate from 1st March to 30 September 2010 – period where surveys were carried out – averaged XOF 1= USD 0.002 (Source: http://www.exchangerates.org.uk/XOF-USD-exchange-rate-history.html; access on 13 December 2010).

Table 2
Price decomposition along the value chain, for a loading of 600 teak poles

Agent	Item	Amount (XOF[a])
Planters	Planting material	2686
	Transport of seedlings	46
	Broker commission	1666
	Remuneration of rural workers	13407
	Total costs	17805
	Poles revenue	65793
	Firewood revenue	4376
	Maize revenue	7658
	Turnover*	77827
	Value added	73429
	Gross profit	60022
Traders	Purchase of teak poles	65793
	Transportation of teak poles	72789
	Other**	18101
	Remuneration of rural workers	29455
	Remuneration of urban workers	25229
	Bribe	24629
	Financial costs	571
	Total taxes	6895
	Total costs	243461
	Turnover	384258
	Value added	227576
	Gross profit	140797

Note: The value added is obtained by subtracting 'intermediate inputs' from the turnover. A planter's level, 'Intermediate inputs' is the sum of the costs of teak planting material and its transportation to the field, and broker commission. At trader's level, 'intermediate inputs' encompasses the transportation of teak pole, trader's travel, communication, renting of the retail outlet, licence costs, and broker commission.
* The turnover at planter level is the sum of teak pole revenue, firewood revenue, and maize revenue.
** This includes the following items: broker commission, trader's travel, communication, renting of the retail outlet, and licence costs.
[a] XOF: Local currency; the exchange rate in 2010 averaged XOF 1= USD 0.002.

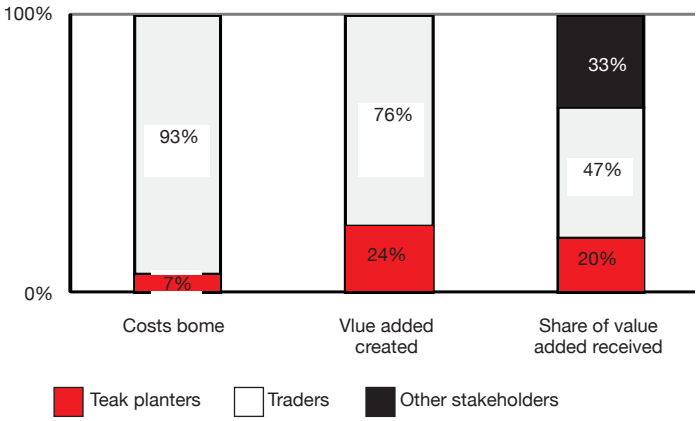

Figure 3: Costs and benefits sharing among stakeholders in the smallholder-produced teak poles value chain in Southern Benin.

Contribution to value addition, costs and benefits sharing in the value chain

The price decomposition along the value chain is shown in table 2. Further details on costs and benefits sharing among value chain participants are presented in figure 3. Traders' figures were consistently higher as compared to planters' for the costs borne in the value chain (Student's *t* test, p= 0.000), the value added created (Student's *t* test, p= 0.000), and the gross profit received (Student's *t* test, p= 0.000). Planters' share of the total costs was low, as compared to traders' (Figure 3). Regarding the contribution to the value added, the major part of the value added was generated through marketing activities, with three quarters of the value added created at traders' level (Figure 3). Planters and traders, the main stakeholders shared 67% of the value added created in the value chain. Traders' gross profit represented almost half of the value added while planters' share was one fifth. One third of the value added was shared among other stakeholders (Table 2, Figure 3). Workers ranked second among value added beneficiaries, with a share of 22.6% (Table 1). The remuneration of rural workers included wages for tree planting, silvicultural treatments, and marketing functions performed at village level (logging and loading), while the remuneration of urban workers was related to the following activities: off-loading, sorting, retail sale and security. The fourth more important item in the value added was bribe to government workers which amounted to one tenth of the value added (Table 1). The other components were taxes at both local and national levels, and financial costs representing 2.3% and 0.2% of the value added, respectively (Table 1). No tax was collected at planters' level, and only traders secured credit from institutions of micro-finance in the framework of their activities (Table 2).

Discussion

Value added in the value chain

The study brought evidence that the farm-grown teak poles value chain in Southern Benin contributed to wealth increase, as hypothesised, given the positive value added. However, value addition was limited basically to the transfer of timber to the retail outlet; no processing occurred apart from manual quarrying - i.e., the removal of the bark and part of the sapwood to have approximately parallelepipedic shape. In reality, little potential exists for further value addition to teak pole with the current technological level, given the small diameter of this timber (5 to 15 cm). However, the production of poles tallies with the local context of Southern Benin characterised by the demand for cheap construction timber in metropolitan regions.
Forestry is usually characterised by the existence of externalities. In the case of the smallholder-produced teak poles value chain in Southern Benin, the real contribution to wealth increase is higher than reported here because, at farmers' level, the study did not value

environmental services provided by forest plantations (soil and water conservation, carbon sequestration, etc.) that are often significant (4).
Transport (three quarters of intermediate inputs) was a critical item in the value chain. These results suggest that transport should receive a careful attention if the overall efficiency of the value chain is to be improved. Other studies have highlighted the importance of transport costs in the marketing of agricultural products in Sub-Saharan Africa (6, 9). Besides the effect of distance, transport costs are influenced by the quality of roads (19). In the case of teak poles marketing in Southern Benin, transport costs are also influenced by the outdated state of the lorries, leading to frequent breakdowns and high maintenance costs (3). As argued by these authors, the improvement of transport conditions cannot be realistically handled in the single framework of timber marketing, but it might be addressed in the general framework of policy intended to support the efficiency in the marketing of agricultural products.

Equity in the value chain and upgrading potential for smallholder farmers

Both teak planters and traders had a positive return from their activities. Profitability of activities is an important criterion to expect those agents to continue to perform their functions in the value chain. Two distinct conclusions can be draw from the analysis of costs and benefits sharing among value chain stakeholders, by considering separately the evenness in benefits sharing and equity in the value chain. First, the sharing of benefits is drastically uneven to the detriment of teak planters. This suggests a poor competitiveness of farmers with respect to value appropriation in the value chain. Second, given that traders were the main contributors to value addition and bear the major part of costs in the value chain (Figure 3), the results did not provide sufficient evidence of inequity to the disadvantage of teak planters, hence the rejection of the second hypothesis. The latter conclusion tallies with other studies reporting on the lack of evidence of an exploitive role of middlemen (11).
Farmers' low costs in the value chain could be related partly to the non valuation of land; but the opportunity cost of that asset is low, owing to the fact that teak is planted on degraded land with a low production potential. Even though farmers might be disadvantaged to some extent by their weak bargaining power, by accepting low prices for their products, the value share of a given agent depends basically on its functions in the value chain. Therefore, the low share of benefits captured by farmers stems from the fact that their involvement in value chains is often limited to low value added functions. In the timber value chain investigated, farmers concentrated merely on production function and sell stumpage timber. By contrast, the marketing functions performed by traders included a diversified range of activities (timber logging, loading, transportation, off-loading, sorting, and retailing).
The upgrading potential of an agent depends on its ability to acquire new and more remunerative functions in the value chain (8). Rather than selling stumpage timber, planters could acquire new functions such as logging and sorting, so as to increase the farm-gate value of teak poles. However, this upgrading path requires the ability to supply consistent volumes over time; so that it is not realistic at the level of individual farmers, given the small estates of their teak plantations: 50% of farmers hold less than 0.83 ha of plantations (2). It is argued that collective marketing could enable teak planters to deliver consistent volume over time, and improve coordination in the value chain thanks to contractual arrangements between traders and planters groups. Capturing this potential will require support to the development of planters' associations which did not exist during the period of the study (2). Moreover, group marketing has the potential to bring economies of scale, improve farmers bargaining power and their marketing performance (13).
Besides the returns to planters and traders, 33% of the value added was shared among other stakeholders. The value chain had a positive social impact, as shown by revenues to rural and urban workers (Table 1). The low taxation in the value chain is in concordance with the objective of Beninese government to encourage reforestation on privately owned lands. Bribe was a key component of the value added. This rent was collected by forest service workers on check points during timber transportation, the issue of logging permits and pass, professional licences and other formalities. Since the stumpage price of timber is a residual value (16), any rent collected during timber marketing is done to the detriment of farmers' income. Therefore, the control over rent that is the responsibility of governments could enable increased returns to planters. We agree with other scholars on the necessity to improve the functioning of the forest service, and undertake sound reforms in the forestry sector (3, 20).

Conclusions

The study was to assess the value added in the smallholder-produced teak poles value chain, in Southern Benin, and the fairness in its distribution among chain stakeholders. The value added was positive, so that the farm-grown teak poles value chain contributed to wealth increase, as hypothesised. Transportation was a critical issue to the overall efficiency of the value chain. The improvement of transport infrastructures might be addressed in the general framework of efficient marketing of farm products.
The general picture emerging from the analysis of costs and benefits sharing is the uneven distribution of the value added to the detriment of teak planters;

but there was no sufficient evidence of inequity to their disadvantage, hence the rejection of the second hypothesis. For policy makers, the critical issue is to seek out relevant upgrading paths for farmers in the value chain. In order to improve their competitiveness with respect to value appropriation, teak planters need to acquire new functions such as logging and sorting that can be performed at village level. This upgrading path would require collective marketing through planters' associations which development should be supported. Bribe was a key component of the value added, with a negative impact on planters' return. Tackling rent-seeking behaviour from government workers through a proper implementation of the forest regulation could improve farmer's return in the value chain.

This article shows an instantaneous picture of benefits sharing in the value chain, yet we need further studies to get a deeper knowledge. It would be useful, in future studies, to analyse the system from a dynamic perspective to see what changes occur over time. Moreover, the assessment of environmental services which was out of the scope of this study will be useful to enlighten policies targeted to the value chain.

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Literature

1. Altenburg T., 2006, Donor approaches to supporting pro-poor value chains. Report prepared for the Donor Committee for Enterprise Development Working Group on Linkages and Value Chains with the support of UNIDO and FAO, 61 p.
2. Aoudji A.K.N., Adégbidi A., Agbo V., Atindogbé G., Toyi S.S.M., Yêvidé A.S.I., Ganglo J.C. & Lebailly P., 2012, Functioning of farm-grown timber value chains: lessons from the smallholder-produced teak (*Tectona grandis* L.f.) poles value chain in Southern Benin. Forest Policy Econ. 15C, 100-109.
3. Aoudji A.K.N., Adégbidi A., Agbo V., Ganglo J.C. & Lebailly P., 2011, Coûts et valeur ajoutée dans la commercialisation des perches de teck au Sud-Bénin. Cah. Agric. 20, 480-486.
4. Cao Y., Ouyang Z.Y., Zheng H., Huang Z.G., Wang X.K. & Miao H., 2008, Effects of forest plantations on rainfall redistribution and erosion in the red soil region of Southern China. Land Degrad Dev. 19, 321-330.
5. Coughlan A.T., Anderson E., Stern L.W. & El-Ansary A.I., 2001, Marketing Channels, Prentice Hall, New Jersey, 590 p.
6. Fafchamps M. & Gabre-Madhin E., 2006, Agricultural markets in Benin and Malawi. AfJARE, 1, 67-94.
7. Fraval P., 2000, Éléments pour l'analyse économique des filières agricoles en Afrique sub-saharienne. Ministère des Affaires étrangères, 100 p.
8. Gereffi G., 1999, International trade and industrial upgrading in the apparel commodity chain. J. Int. Econ. 48, 37-70.
9. Jatau D.F., 2008, Profitability assessment of *Borassus aethiopum* (Mart) marketing in Adamawa State, Nigeria. J. Agri. Soc. Sci. 4, 159-164.
10. Jayne T.S. & Jones S., 1997, Food marketing and pricing policy in Eastern and Southern Africa: a survey. World Dev. 25, 1505-1527.
11. Jensen A., 2009, Valuation of non-timber forest products value chains. Forest Policy Econ. 11, 34-41.
12. Keyser J.C., 2006, Description of methodology and presentation of templates for value chain analysis; Part 1: Narrative text. Background paper for the competitive commercial agriculture in Sub-Saharan Africa (CCAA) study, 35 p.
13. Kruijssen F., Keizer M. & Giuliani A., 2009, Collective action for small-scale producers of agricultural biodiversity products. Food Policy, 34, 46-52.
14. Lebailly P., Dogot T., Bien P.V. & Khai T.T., 2000, La filière rizicole au Sud Viêt-Nam - Un modèle méthodologique. Gembloux Agronomic Press, Gembloux, 142 p.
15. Maraseni T.N., Shivakoti G.P., Cockfield G. & Apan A., 2006, Nepalese non-timber forest products: an analysis of the equitability of profit distribution across a supply chain to India. Small-scale Forest Economics, Management and Policy, 5, 191-206.
16. Nautiyal J.C., Kant S. & Williams J.S., 1995, A mechanism for tackling the value of standing timber in an imperfect market. Can J. For. Res. 25, 638-648.
17. Nawir A.A., Kassa H., Sandewall M., Dore D., Campbell B., Ohlsson B. & Bekele M., 2007, Stimulating smallholder tree planting – lessons from Africa and Asia. Unasylva, 58, 53-59.
18. Riahi-Belkaoui A., 1999, Net value added and earnings determination. Review of quantitative finance and accounting, 13, 393-399.
19. Shepherd A.W., 2007, A guide to marketing costs and how to calculate them - Revised and reprinted 2007. FAO, Rome, 59 p.
20. Siebert U. & Elwert G., 2004, Combating corruption and illegal logging in Bénin, West Africa: recommendations for forest sector reform. J Sustain Forest, 19, 239-261.
21. Tallec F. & Bockel L., 2005, Commodity chain analysis: financial analysis. FAO, Rome, 18 p. Online: www.fao.org/tc/easypol (downloaded on 6 May 2009).
22. Vodouhê F.G., Coulibaly O., Assogbadjo A.E. & Sinsin B., 2008, Medicinal plant commercialization in Benin: an analysis of profit distribution equity across supply chain actors and its effect on the sustainable use of harvested species. J. Med. Plant. Res. 2, 331-340.

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